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(54) SMALL ANIMAL-CONTROLLING RESIN COMPOSITION AND SMALL ANIMAL-CONTROLLING MEMBER PREPARED BY MOLDING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a resin composition having a strength, heat resistance and chemical resistance, capable of manifesting the performance of controlling small animals for a long term and used as a structural material or the like.

SOLUTION: This small animal-controlling resin composition includes (A) at least one kind of resins selected from the group consisting of a polyamide resin and a polyacetal one, (B) at least one kind of compounds selected from the group consisting of sulfonamide derivatives, sulfonate ones, phosphate ones, phosphazene ones, carboxylic acid amide ones and carboxylate ones and (C) a small animal-controlling chemical.

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CLAIMS

[Claim(s)]

[Claim 1] (A) At least one sort of compounds chosen from polyamide resin, at least one sort of resin chosen from polyacetal resin, (B) sulfonamide derivative, a sulfonate derivative, a phosphoric ester derivative, a phosphazene derivative, a carboxylic amide derivative, and a carboxylate derivative, and the mite prevention nature resin constituent characterized by containing the drugs which have (C) mite prevention nature.

[Claim 2] Furthermore, the mite prevention nature resin constituent according to claim 1 with which it comes to blend a (D) fibrous inorganic filler.

[Claim 3] The mite prevention nature member characterized by coming to fabricate a mite prevention nature resin constituent according to claim 1 or 2.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the mite prevention nature member which comes to fabricate a mite prevention nature resin constituent and this resin constituent.

[0002]

[Description of the Prior Art] In the electrical machinery and apparatus, the transportation device, etc., the failure and the failure resulting from invasion into devices, such as an insect, pose a problem. For example, in the television set, it might be induced the warm temperature in a device, and mites, such as Insecta and a spider, might invade from the stoma of device regions of back, and it might carry out short-circuiting a circuit etc., and might become the cause of failure. Moreover, also in the precision computer, a telephone-exchange machine, an industrial robot, etc., the insect etc. might trespass upon the interior of a device and it might become the cause of failure generating.

[0003] Since this problem is solved, it can consider making the resin ingredient used as structural members, such as a device, a sheathing member, fluid transfer tubing, a driving member, etc. support the mite prevention nature matter. As a resin ingredient which has mite prevention nature, elasticity resin [straight chain-like low-molecular-weight-polyethylene resin, polypropylene resin, polyvinyl chloride resin, etc.] resin is used as matrix resin until now, and the resin constituent which comes to blend an insecticide etc. is proposed. These resin has the fault that it is [in / reinforcement, thermal resistance, chemical resistance, etc. / on the other hand] inadequate although it is resin which can hold drugs, such as an insecticide, in large quantities. Therefore, the adoption to the collar of the application for which the use scene is not extremely limited and hardly needs reinforcement, for example, a cat, etc. is possible for the member which comes to fabricate this resin constituent itself as a molding material (reference, such as JP,6-315332,A, JP,5-284871,A, and JP,6-141724,A).

[0004] Moreover, although sustained-release is not shown even if it blends drugs, since it is inferior to the capacity which is resin excellent in thermal resistance or chemical resistance for these resin to usually support said drugs in the so-called engineering plastics, but the mite prevention effectiveness is not discovered at all or an initial effect is discovered, it has the fault that the mite prevention effectiveness will be extinguished for a short period of time.

[0005] In view of the technical problem of this conventional technique, this invention is a resin ingredient used as a structural material etc., and it makes it a technical problem to offer the resin constituent which continues at a long period of time and may discover the mite prevention engine performance while it has reinforcement, thermal resistance, and chemical resistance.

[0006]

[Means for Solving the Problem] Namely, at least one sort of resin with which this invention is chosen from (A) polyamide resin and polyacetal resin (It may only be hereafter called "A component"), (B) sulfonamide derivative, A sulfonate derivative, a phosphoric ester derivative, a phosphazene derivative, At least one sort of compounds (it may only be hereafter called "B component") chosen from a carboxylic amide derivative and a carboxylate derivative and the mite prevention nature resin constituent containing the drugs (it may only be hereafter called "C component") which have (C) mite prevention nature are started. Moreover, this invention relates to the mite prevention nature resin constituent of claim 1 with which it comes to blend a (D) fibrous inorganic filler (for it to only be hereafter called "D component") further. Moreover, this invention relates to the mite prevention nature member which comes to fabricate said which mite prevention nature resin constituent.

[0007]

[Embodiment of the Invention] In this invention, aromatic polyamide resin, such as polyamide resin [, such as polyamide 6, polyamide 66, polyamide 11, and polyamide 12 resin,], Polyamide MXD, and polyamide 6T resin, can be illustrated as an example of polyamide resin among at least one sort of resin chosen from (A) polyamide resin and polyacetal resin.

[0008] Moreover, as an example of polyacetal resin, an oxy-methylene unit besides the homopolymer which consists only of an oxy-methylene unit is used as a principal component, and the copolymer which includes other copolymerization units, such as an oxyethylene unit, in this as an accessory constituent; the cross linked polymer to which these are made to come to construct a bridge, or the graft copolymer which comes to carry out graft copolymerization can be illustrated. (A) Two or more sorts of mixture which is independent or was chosen from these in one sort chosen from polyamide resin or polyacetal resin can be used for a component.

[0009] The polyamide resin or polyacetal resin used as a (A) component in this invention may be used as an alloy

with other resin, unless the effectiveness of this invention is spoiled. In this alloy, as resin employable as other resin, polyethylene, polypropylene, polystyrene, acrylonitrile-butadiene-styrene resin, polyethylene terephthalate, polybutylene terephthalate, a polycarbonate, polyarylate, polyphenylene ether, thermoplastic polyurethane, liquid crystallinity polyester, etc. can be mentioned, and these can be blended and used at a rate of under 70 weight sections into the (A) component.

[0010] (B) At least one sort of compounds chosen from a sulfonamide derivative, a sulfonate derivative, a carboxylic amide derivative, and a carboxylate derivative carry out dissolution maintenance of the (C) component, and it is thought that it has the operation which gives sustained-release. Among these (B) components, as a carboxylate derivative, since what can illustrate the alkyl ester of the various carboxylic acids which may be permuted with a hydroxyl group, a nitro group, the amino group, an epoxy group, a halogen, etc., aromatic series ester, etc., and has a hydroxyl group and an epoxy group has good compatibility with a polyamide, it is desirable.

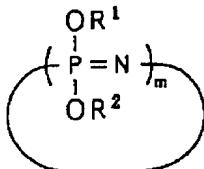
[0011] As an example of a carboxylate derivative For example, dimethyl phthalate, diethyl phthalate, G n-octyl phthalate, Diphenyl phthalate, benzyl phthalate, dimethoxy ethyl phthalate, 4, 5-epoxy hexahydrophthalic acid di(2-ethylhexyl), 4, 5-epoxy cyclohexa ***** (7, 8-epoxy-2-OKUTENIRU), 4, 5-epoxy cyclohexa ***** (9, 10-epoxy octadecyl), 4, 5-epoxy cyclohexa ***** (10, 11-epoxy undecyl), Phthalic ester derivatives, such as an ethylene oxide addition product of ***** (tetrahydro full FURIOKISHI ethyl), various phthalic-acid mixing ester, and phthalic-acid mixing ester, An isophthalic acid ester derivative, a tetrahydrophthalic acid ester derivative, Para hydroxybenzoic-acid butoxy ethyl, Para hydroxybenzoic-acid SHIKUROHEKI siloxy ethoxy ethoxyethyl, Para hydroxybenzoic-acid 2-ethylhexyl, the hydroxybenzoic-acid ester of omega-alkyl oligo ethylene oxide, Benzoate derivatives, such as the Para hydroxybenzoic-acid addition product of undecyl glycidyl ether, Propionic-acid ester derivatives, such as ***** (tetrahydro full FURIOKISHI ethyl), An adipate derivative, an azelate derivative, a sebacic-acid ester derivative, A dodecane-2-acid ester derivative, a maleate derivative, a fumaric-acid ester derivative, A TORIMETTO acid ester derivative, citric-acid Tori (butoxy ethoxyethyl), Citric-acid di-n-octyl-monochrome (nonylphenoxyethyl), citric-acid Tori n-octyl, Citric-acid dioctyl (tetrahydro full FURIOKISHI ethyl), citric-acid Tori Millis Chill, Citrate derivatives, such as triethyl SHITORETO, an itaconic-acid ester derivative, Oleate derivatives, such as tetrahydrofurfuryl oleate, A ricinoleic-acid ester derivative, a lactic acid (n-butyyl), a lactic acid (2-ethylhexyl), A lactic acid (n-butoxy ethoxyethyl), a lactic acid (n-octoxy ethoxyethyl), Lactate derivatives, such as a lactic acid (n-decyloxy ethoxyethyl), Tartaric-acid JI (octoxy ethoxyethyl), a tartaric acid (n-octyl) (nonylphenoxyethyl), Tartrate derivatives, such as tartaric-acid JI (octoxy ethoxyethyl), Salicylate derivatives, such as malic-acid ester derivatives, such as malic-acid dibutoxy ethyl, ***** (n-butoxy ethoxyethyl), malic-acid distearyl, and malic-acid octadecenyl iso nonyl, and a salicylic-acid addition product of benzyl glycidyl ether, etc. can be illustrated. As a phosphoric ester derivative, moreover, trimethyl phosphate, triethyl phosphate, Tributyl phosphate, tree (2-ethylhexyl) phosphate, 2-ethylhexyl diphenyl phosphate, tributoxyethyl phosphate, Triphenyl phosphate, cresyl diphenyl phosphate, isodecyldiphenylphosphate, Tricresyl phosphate, trixylenyl phosphate, Tori (chloro ethyl) phosphate, xylenyl diphenyl phosphate, tetrakis (2, 4-JI tertiary butylphenyl) 4, 4'-biphenylene JIHOSUFONETO, etc. can be illustrated.

[0012] Moreover, as an example of a phosphazene derivative, it is the following general formula (1).

[0013]

[Formula 1]

一般式 (1)

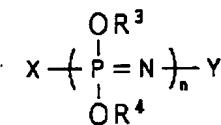


[0014] m shows the integer of 3-25 among [type. It differs and R1 and R2 show the same or the phenyl group which may be permuted by the alkyl group of carbon numbers 1-8, the alkyl group of carbon numbers 1-8, and/or the allyl group.] The annular phosphazene compound, the following general formula (2) which are come out of and expressed

[0015]

[Formula 2]

一般式 (2)



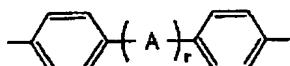
[0016] n shows the integer of 3-1000 among [type. It differs and R3 and R4 show the same or the phenyl group which may be permuted by the alkyl group of carbon numbers 1-8, the alkyl group of carbon numbers 1-8, and/or the allyl group. X shows radical-N=P (OR3)3, radical-N=P (OR4)3, radical-N=P (O) (OR3) or radical-N=P (O), and

(OR4). Y — a radical — P (OR3) — four — a radical — P (OR4) — four — a radical — P — (— O —) (OR3) — two — or — a radical — P — (— O —) (OR4) — two — being shown .] At least one sort of phosphazene compounds which came out and were chosen from the straight chain-like phosphazene compounds expressed and these phosphazene compounds are the following general formulas (3) to o-, m- or p-phenylene group, and a biphenylene radical list.

[0017]

[Formula 3]

一般式(3)



[0018] r shows 0 or 1 among [type, and A shows radical —SO2—, —S—, —O—, or —C(CH₃)₂—.] The phosphazene compound with which the bridge was constructed over between two oxygen atoms with which the alkyl group etc. was desorbed from substituents R1, R2, R3, and R4 by at least one sort of bridge formation radicals chosen from the group which comes out and consists of a radical expressed is mentioned.

[0019] As an example of an annular phosphazene compound expressed with a general formula (1), annular phosphazene compounds, such as hexa phenoxy cyclotriphosphazene, OKUTA phenoxy cyclotetraphosphazene, deca phenoxy cyclopentaphosphazene, hexa propoxy cyclotriphosphazene, OKUTAPUROPOKISHIKISHI cyclotetraphosphazene, and deca propoxy cyclopentaphosphazene, are mentioned.

[0020] Moreover, as an example of a straight chain-like phosphazene compound expressed with a general formula (2), the chain-like phosphazene compound which permuted the propoxy group and/or the phenoxy group by chain-like dichlorophosphazene is mentioned.

[0021] As an example of the structure of cross linkage expressed with a general formula (3), a 4 and 4'-sulfonyl diphenylene (bisphenol-S residue), 4, and 4'-oxydiphenylene radical, 4, and 4'-thio diphenylene radical, 4, and 4'-diphenylene radical etc. can be mentioned, for example.

[0022] The amino group and/or a phenylamino radical may permute these phosphazene derivatives by the location of arbitration. Said one kind may be independently used for these phosphazene derivatives, and two or more sorts of mixture may be used for them. Moreover, you may be the mixture of annular phosphazene and straight chain-like phosphazene.

[0023] Moreover, N-cyclohexyl benzoic-acid amide etc. can be illustrated as a carboxylic amide derivative.

[0024] Moreover, as a sulfonamide derivative, an N-methyl-benzene sulfo amide, N-ethyl benzene sulfo amide, an N-butyl-benzene sulfo amide, an N-cyclohexyl-benzene sulfo amide, an N-ethyl-P-toluene sulfo amide, an N-butyl-toluene sulfo amide, an N-cyclohexyl-toluene sulfo amide, etc. can be illustrated.

[0025] Moreover, benzenesulfonic acid ethyl etc. can be illustrated as a sulfonate derivative. (B) Two or more sorts of mixture which is independent or was chosen from these in one sort chosen from the sulfonamide derivative, the sulfonate derivative, the carboxylic amide derivative, and the carboxylate derivative can be used for a component.

[0026] (C) the compound which is the drugs which have the prevention activity of mites, such as Insecta of various kinds of agricultural noxious insects, a medically important insect, and others, spiders, Acari, and a rat, as drugs which have mite prevention nature, and has mite evasion activity, insect-killing activity, ** tick activity, and ***** activity — the compound which has ***** activity, such as **** activity, youthfully, the compound which has the food intake inhibition activity of a mite, the compound which has the growth control activity of a mite can illustrate.

[0027] As an example of drugs of having this mite prevention nature A chloro nicotinyl system insecticide like imidacloprid, the compound which consists of a neo fill radical which has a silicon atom like silafluofen, Benfuracarb, ARANIKARUBU, methoxy JIAZON, a cull boss fan, Carver mate system compounds, such as fenobucarb, carbaryl, a meso mill, pro POKUSA, and phenoxy KARUBU, Pyrethrin, allethrin, dl, d-T80-allethrin, d-T80-RESUME thorin, Biotechnology allethrin, d-T80-free-wheel-plate RUSURIN, free-wheel-plate RUSURIN, RESUME thorin, FURAME thorin, pro pass phosphorus, permethrin, AKURINA thorin, etofenprox, TORAROME thorin, FENO thorin, d-FENO thorin, fenvalerate, Pyrethroid system compounds, such as en pen thorin, PURARE thorin, tefluthrin, and BENFURUSURIN, A dichloro boss, fenitrothion, diazinon, marathon, promo FOSU, Fenthion, trichlorfon, naled, temephos, FENKUROHOSU, Organic phosphorus system compounds, such as chlorpyrifos methyl, SHIAHOSU, calclofos, aza-MECHIHOSU, pyridaphenthion, pro PETANHOSU, and chlorpyrifos, and these isomers, a derivative, an analog, etc. can be illustrated. Moreover, the compound which has the activity which controls growth of mites, such as methoprene, pyriproxyfen, kino PUREN, hydroprene, DEOHENORAN, NC-170, full FENOROKUSURON, JIFURUBENZURON, RUFENURON, and KURORU azlon, is mentioned. Moreover, as Kelthane, clo RUFENABIRU, DEBUFEMPIRADO pyridaben, MIRUBEME cutin, fenpyroximate, and a rodenticide, scilliroside, NORUBOMAIDO, next door-ized zinc, thallium sulfate, ****, ANTSU, walfarin and a side, a coumarin, a bear tetralin, pro serious ORON, DIFECHIARON, etc. are mentioned as miticide.

[0028] (D) as a fibrous inorganic filler, what has 0.05–10 micrometers of diameters of average fiber and the configuration of 3–150 micrometers of mean fiber length uses preferably — having — for example, 4 potassium titanate fibers, 6 potassium titanate fibers, 8 potassium titanate fibers, titania fiber, monoclinic-system titania fiber, a silica fiber, straw SUTONAITO, xonotlite, etc. — it can illustrate — various fillers — independent — or it can mix and use. Also in these fibrous inorganic bulking agents, especially 8 potassium titanate fibers are desirable. Since it

can raise sustained-release further if a fibrous inorganic filler is blended, it is desirable. Moreover, combination of a fibrous inorganic filler is desirable in order to contribute mechanical physical properties also to improvement.

[0029] Even if it remains as it is, it can be used, but in order that a fibrous inorganic filler may raise an interface adhesive property with resin and may raise mechanical physical properties further, by finishing agents, such as silane coupling agents, such as an amino silane, an epoxy silane, and an acrylic silane, or a titanate coupling agent, surface treatment of it may be carried out and it may be used.

[0030] In the resin constituent of this invention, it is the range which does not spoil the purpose of this invention, and inorganic fillers, such as a zeolite, can also be used together.

[0031] although it can set up suitably by the component chosen concretely as the blending ratio of coal of each component in the resin constituent of this invention — usually — the (A) component 100 weight section — receiving — the (B) component 0.05 — the 100 weight sections — it is preferably good 2 ~ 50 weight section, the (C) component 0.01 ~ 30 weight sections, and for 0.1 ~ 20 weight section to come out comparatively preferably, and to blend.

[0032] Moreover, when blending the (D) component, the loadings are good to consider as 2 ~ 60 weight section to the (A) component 100 weight section. (D) If the loadings of a component exceed 60 weight sections, since shaping will become difficult, if less than 2 weight sections, the effectiveness which blends a fibrous inorganic filler will not be acquired enough preferably.

[0033] The mite prevention nature resin constituent of this invention can be manufactured by blending for example, each component and carrying out melting kneading. Combination of each component can be performed by blending dryly using a tumbler, a blender, a mixer, etc. beforehand, and can also perform [supply / of a kneading machine / from a different hopper / the same or] each component. The mite prevention nature resin constituent of obtained this invention is fabricated in the configuration of a direct request, it may be kept, and it being good also as a mite prevention nature member, and once pelletizing by the pelletizer after extrusion etc. may carry out and circulate it. What was made into the pellet etc. can be fabricated by the well-known approach.

[0034] On the occasion of shaping of the mite prevention nature resin constituent of this invention, it can fabricate by various kinds of well-known shaping approaches, for example, injection molding, extrusion molding, press forming, blow molding, machining shaping, etc. can be illustrated as this shaping approach. As a configuration of the mite prevention nature member of this invention, there is especially no limit and plate-like, a cylinder, cylindrical, Kushigata, a globular form, etc. can make it all configurations. Moreover, with the usual resin constituent metallurgy group etc., multi-color molding can be carried out and a request part can also use the mite prevention nature resin constituent of this invention as a two color thru/or the structural member which has mite prevention nature.

[0035]

[Example] An example and the example of a comparison are hung up over below, and this invention is further explained to a detail.

[0036] Examples 1~3 and 1~445mm phi twin screw extruder of examples of a comparison are used, and it is set as the resin temperature of 190 degrees C, and is the (A) component (a polyamide 12 is used as polyamide resin.) from the Maine hopper. The trade name "die amide L1940" die cel Huels, Inc. make. It supplies and the column of the class of front Naka is made to carry out melting of the display to "PA." The (B) component of the rate shown in following Table 1 or 2 with a plunger pump from a twin screw extruder side hopper (an N-butyl-benzene sulfo amide is used as a sulfonamide derivative.) the column of the class of front Naka — "A", a display, and the (C) component (permethrin is used as an insecticide.) In the column of the class of front Naka, the mixture of "A" and a display was pressed fit, was pelletized continuously, and the resin constituent of examples 1~3 and the examples 1~4 of a comparison was obtained. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet. However, drugs are carrying out bleed out of the resin constituent of the example 4 of a comparison to the pellet front face, and shaping of an injection-molded product was not able to do it.

[0037]

[Table 1]

	(A) 成分		(B) 成分		(C) 成分		(D) 成分		殺虫活性		
	種類	配合量	種類	配合量	種類	配合量	種類	配合量	7日	3ヶ月	6ヶ月
実施例 1	PA	80	A	15	A	5	—	—	O	△	X
実施例 2	PA	75	A	15	A	10	—	—	O	○	X
実施例 3	PA	65	A	15	A	20	—	—	O	△	X
実施例 4	POM	85	A	10	A	5	—	—	O	△	X
実施例 5	POM	80	A	10	A	10	—	—	O	○	△
実施例 6	POM	70	A	10	A	20	—	—	O	△	X
実施例 7	PA	80	A	15	B	5	—	—	O	△	X
実施例 8	PA	75	A	15	B	10	—	—	O	△	X
実施例 9	PA	65	A	15	B	20	—	—	O	△	X
実施例 10	PA	80	B	15	A	5	—	—	O	△	X
実施例 11	PA	75	B	15	A	10	—	—	O	△	X
実施例 12	PA	65	B	15	A	20	—	—	O	△	X
実施例 13	PA	80	C	15	A	5	—	—	O	△	X
実施例 14	PA	75	C	15	A	10	—	—	O	△	X
実施例 15	PA	65	C	15	A	20	—	—	O	○	△
実施例 16	PA	70	A	15	A	5	A	10	O	○	△
実施例 17	PA	60	A	15	A	5	A	20	O	○	○
実施例 18	PA	65	A	15	A	10	A	10	O	○	○
実施例 19	PA	55	A	15	A	10	A	20	O	○	○
実施例 20	PA	55	A	15	A	20	A	20	O	○	○
実施例 21	PA	45	A	15	A	20	A	20	O	○	○

[0038]

[Table 2]

	(A) 成分		(B) 成分		(C) 成分		(D) 成分		殺虫活性		
	種類	配合量	種類	配合量	種類	配合量	種類	配合量	7日	3ヶ月	6ヶ月
比較例 1	PA	85	A	15	—	0	—	—	X	—	—
比較例 2	PA	95	—	0	A	5	—	—	O	X	—
比較例 3	PA	90	—	0	A	10	—	—	O	X	—
比較例 4	PA	80	—	0	A	20	—	—	—	—	—
比較例 5	POM	90	A	10	—	0	—	—	X	—	—
比較例 6	PP	80	—	0	A	20	—	—	—	—	—
比較例 7	EVA	80	—	0	A	20	—	—	—	—	—

[0039] Examples 4-6 and 545mm phi twin screw extruder of examples of a comparison are used, and it is set as the resin temperature of 185 degrees C, and is the (A) component (polyacetal resin.) from the Maine hopper. A trade name "Duracon M90-44", Polyplastics, Inc. make. It supplies and the column of the class of front Naka is made to carry out melting of the display to "POM." From the twin screw extruder side hopper, with the plunger pump, it pressed fit, and the mixture of the (B) component (an N-butyl-benzene sulfo amide is used as a sulfonamide derivative) of the rate shown in Table 1 or 2 and the (C) component (it considers as an insecticide and permethrin is used) was pelletized continuously, and the resin constituent of examples 4-6 and the example 5 of a comparison was obtained. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

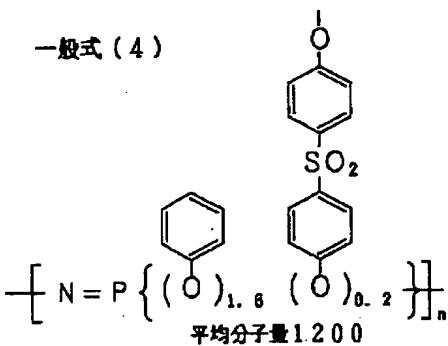
[0040] It is methoxy JIAZON (insecticide.) about an examples 7-9 (C) component. It changed to the column of the class of front Naka at "B" and a display, and also the resin constituent of examples 7-9 was obtained like the example 1. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

[0041] It is Para hydroxybenzoic-acid 2-ethylhexyl (carboxylate derivative.) about an examples 10-12 (B) component. It changed to the column of the class of front Naka at "B" and a display, and also the resin constituent of examples 10-12 was obtained like the example 1. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

[0042] The examples 13-15 (B) component was changed to the phosphazene system compound (it is displayed on the column of the class of front Naka as "C") expressed with the following general formula (4), and also the resin constituent of examples 13-15 and the example 8 of a comparison was obtained like the example 1. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

[0043]

[Formula 4]



[0044] 16-2145mm phi twin screw extruder of examples is used, and it is set as the resin temperature of 190 degrees C, and is A component (the same polyamide resin as an example 1 is used.) from the Maine hopper. It supplies and melting of the trade name "the die amide L1940" is carried out. From a twin screw extruder side hopper, the mixture of the (B) component (N-butylbenzene sulfonic-acid amide is used as a sulfonamide derivative) of the rate shown in Table 1 with a plunger pump and the (C) component (it considers as an insecticide and permethrin is used) is pressed fit, and it is the (D) component (0.5 micrometers of diameters of average fiber and 8 potassium titanate fibers of 18 micrometers of mean fiber length are used as a fibrous inorganic filler.) further. The trade name "TISUMO D" Otsuka chemistry incorporated company make. Side feed of the display was carried out to "A" at the column of the class of front Naka. Then, it pelletized and the resin constituent of examples 16-21 was obtained. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

[0045] 645mm phi twin screw extruder of examples of a comparison is used, and it is set as the resin temperature of 240 degrees C, and is polypropylene resin (a trade name "UBE polypropylene", Ube Industries, Ltd. make.) from the Maine hopper. For convenience, it sets in the column of the class of front Naka (A) component, and it supplies and melting of the display 80 weight section is carried out to "PP." From the twin screw extruder side hopper, with the plunger pump, it pressed fit, and the (C) component (permethrin is used as an insecticide) of 20 weight sections was pelletized continuously, and the resin constituent of the example 6 of a comparison was obtained. About the resin constituent of the example 6 of a comparison as well as each example, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine.

[0046] 745mm phi twin screw extruder of examples of a comparison is used, and it is set as the resin temperature of 150 degrees C, and is ethylene vinyl acetate system resin (the 32 % of the weight [of vinyl acetate contents], and trade name "URUTORASEN 750" Oriental soda industrial incorporated company make.) from the Maine hopper. For convenience, it sets in the column of the class of front Naka (A) component, and it supplies and melting of the display 80 weight section is carried out to "EVA." From the twin screw extruder side hopper, with the plunger pump, it pressed fit, and the (C) component (permethrin is used as an insecticide) of 20 weight sections was pelletized continuously, and the resin constituent of the example 7 of a comparison was obtained. About the resin constituent of the example 7 of a comparison as well as each example, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine.

[0047] The mold goods for a test obtained in example of trial 1 each example and the example of a comparison were set by the 25-degree C environment, the gauze (the Toray Industries, Inc. make, trade name "Dacron C-119 sky Larc") was attached in the both ends of the mold goods for a test for the 3rd month in the 6th month on the 7th, five specimens which shut up one KUSAGUMO (Agelena limbata) were created respectively, and the life and death of KUSAGUMO of 24 hours after were checked. It was judged that the life and death of KUSAGUMO were dead when a stimulus is given to KUSAGUMO with pincettes and there is no reaction. A result is shown in Table 1 and 2. In addition, the rate of a specimen to all specimens (five pieces) of having died estimated evaluation of the insect-killing activity in Table 1 and 2. Front Naka, O — 80% or more of death rates of KUSAGUMO, ** — Less than 80% of 40% or more of death rates of KUSAGUMO, x — Less than 40% of death rates of KUSAGUMO is shown.

[0048] The test piece was created with injection molding using the resin constituent of example of trial 2 examples 1 and 4, and the examples 6 and 7 of a comparison, and tensile strength (ASTM D638), flexural strength (ASTM D790), heat deflection temperature (ASTM D648, 4.6kg/cm²), and gasoline-proof nature were examined. in addition, gasoline-proof nature measured the die length of the test piece immediately after being immersed in a gasoline (Idemitsu petroleum incorporated company make, regular gasoline) at 25 degrees C, and taking out a test piece (bore 15mmphi, the thickness of 1.5mm, and die length of 40mm — cylindrical) 24 hours after, and evaluated it by the rate of a dimensional change before and behind immersion. A result is shown in Table 3. In addition, inside of Table 3, O — Less than 0.2% of rates of a dimensional change, ** — 0.2% or more of rates of a dimensional change, x — The dissolution is shown.

[0049]

[Table 3]

	引張強度 (kgf/cm ²)	曲げ強度 (kgf/cm ²)	熱たわみ温度 (°C)	耐ガソリン性
実施例 1	370	600	135	○
実施例 4	550	800	145	○
比較例 6	330	400	108	△
比較例 7	<50	<50	<40	×

[0050] All the mold goods of each example have insect-killing activity, and especially the mold goods with which the fibrous inorganic filler was blended are excellent in sustained-release so that clearly from the above-mentioned examples 1 and 2 of a trial. Moreover, the mold goods of an example fully have reinforcement, thermal resistance, etc.

[0051]

[Effect of the Invention] As mentioned above, with the mite prevention nature resin constituent concerning this invention, it has reinforcement usable as various kinds of structural members etc., thermal resistance, and chemical resistance, and the mite prevention nature member which continues and can discover the mite prevention engine performance at a long period of time can be obtained.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the mite prevention nature member which comes to fabricate a mite prevention nature resin constituent and this resin constituent.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, with the mite prevention nature resin constituent concerning this invention, it has reinforcement usable as various kinds of structural members etc., thermal resistance, and chemical resistance, and the mite prevention nature member which continues and can discover the mite prevention engine performance at a long period of time can be obtained.

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TECHNICAL PROBLEM

[Description of the Prior Art] In the electrical machinery and apparatus, the transportation device, etc., the failure and the failure resulting from invasion into devices, such as an insect, pose a problem. For example, in the television set, it might be induced the warm temperature in a device, and mites, such as Insecta and a spider, might invade from the stoma of device regions of back, and it might carry out short-circuiting a circuit etc., and might become the cause of failure. Moreover, also in the precision computer, a telephone-exchange machine, an industrial robot, etc., the insect etc. might trespass upon the interior of a device and it might become the cause of failure generating.

[0003] Since this problem is solved, it can consider making the resin ingredient used as structural members, such as a device, a sheathing member, fluid transfer tubing, a driving member, etc. support the mite prevention nature matter. As a resin ingredient which has mite prevention nature, elasticity resin [straight chain-like low-molecular-weight-polyethylene resin, polypropylene resin, polyvinyl chloride resin, etc.] resin is used as matrix resin until now, and the resin constituent which comes to blend an insecticide etc. is proposed. These resin has the fault that it is [in / reinforcement, thermal resistance, chemical resistance, etc. / on the other hand] inadequate although it is resin which can hold drugs, such as an insecticide, in large quantities. Therefore, the adoption to the collar of the application for which the use scene is not extremely limited and hardly needs reinforcement, for example, a cat, etc. is possible for the member which comes to fabricate this resin constituent itself as a molding material (reference, such as JP,6-315332,A, JP,5-284871,A, and JP,6-141724,A).

[0004] Moreover, although sustained-release is not shown even if it blends drugs, since it is inferior to the capacity which is resin excellent in thermal resistance or chemical resistance for these resin to usually support said drugs in the so-called engineering plastics, but the mite prevention effectiveness is not discovered at all or an initial effect is discovered, it has the fault that the mite prevention effectiveness will be extinguished for a short period of time.

[0005] In view of the technical problem of this conventional technique, this invention is a resin ingredient used as a structural material etc., and it makes it a technical problem to offer the resin constituent which continues at a long period of time and may discover the mite prevention engine performance while it has reinforcement, thermal resistance, and chemical resistance.

[Translation done.]

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MEANS

[Means for Solving the Problem] Namely, at least one sort of resin with which this invention is chosen from (A) polyamide resin and polyacetal resin (It may only be hereafter called "A component"), (B) sulfonamide derivative, A sulfonate derivative, a phosphoric ester derivative, a phosphazene derivative, At least one sort of compounds (it may only be hereafter called "B component") chosen from a carboxylic amide derivative and a carboxylate derivative and the mite prevention nature resin constituent containing the drugs (it may only be hereafter called "C component") which have (C) mite prevention nature are started. Moreover, this invention relates to the mite prevention nature resin constituent of claim 1 with which it comes to blend a (D) fibrous inorganic filler (for it to only be hereafter called "D component") further. Moreover, this invention relates to the mite prevention nature member which comes to fabricate said which mite prevention nature resin constituent.

[0007]

[Embodiment of the Invention] In this invention, aromatic polyamide resin, such as polyamide resin [, such as polyamide 6, polyamide 66, polyamide 11, and polyamide 12 resin,], Polyamide MXD, and polyamide 6T resin, can be illustrated as an example of polyamide resin among at least one sort of resin chosen from (A) polyamide resin and polyacetal resin.

[0008] Moreover, as an example of polyacetal resin, an oxy-methylene unit besides the homopolymer which consists only of an oxy-methylene unit is used as a principal component, and the copolymer which includes other copolymerization units, such as an oxyethylene unit, in this as an accessory constituent, the cross linked polymer to which these are made to come to construct a bridge, or the graft copolymer which comes to carry out graft copolymerization can be illustrated. (A) Two or more sorts of mixture which is independent or was chosen from these in one sort chosen from polyamide resin or polyacetal resin can be used for a component.

[0009] The polyamide resin or polyacetal resin used as a (A) component in this invention may be used as an alloy with other resin, unless the effectiveness of this invention is spoiled. In this alloy, as resin employable as other resin, polyethylene, polypropylene, polystyrene, acrylonitrile-butadiene-styrene resin, polyethylene terephthalate, polybutylene terephthalate, a polycarbonate, polyarylate, polyphenylene ether, thermoplastic polyurethane, liquid crystallinity polyester, etc. can be mentioned, and these can be blended and used at a rate of under 70 weight sections into the (A) component.

[0010] (B) At least one sort of compounds chosen from a sulfonamide derivative, a sulfonate derivative, a carboxylic amide derivative, and a carboxylate derivative carry out dissolution maintenance of the (C) component, and it is thought that it has the operation which gives sustained-release. Among these (B) components, as a carboxylate derivative, since what can illustrate the alkyl ester of the various carboxylic acids which may be permuted with a hydroxyl group, a nitro group, the amino group, an epoxy group, a halogen, etc., aromatic series ester, etc., and has a hydroxyl group and an epoxy group has good compatibility with a polyamide, it is desirable.

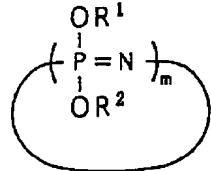
[0011] As an example of a carboxylate derivative For example, dimethyl phthalate, diethyl phthalate, G n-octyl phthalate, Diphenyl phthalate, benzyl phthalate, dimethoxy ethyl phthalate, 4, 5-epoxy hexahydrophthalic acid di(2-ethylhexyl), 4, 5-epoxy cyclohexa ***** (7, 8-epoxy-2-OKUTENIRU), 4, 5-epoxy cyclohexa ***** (9, 10-epoxy octadecyl), 4, 5-epoxy cyclohexa ***** (10, 11-epoxy undecyl), Phthalic ester derivatives, such as an ethylene oxide addition product of ***** (tetrahydro full FURIOKISHI ethyl), various phthalic-acid mixing ester, and phthalic-acid mixing ester, An isophthalic acid ester derivative, a tetrahydrophthalic acid ester derivative, Para hydroxybenzoic-acid butoxy ethyl, Para hydroxybenzoic-acid SHIKUROHEKI siloxy ethoxy ethoxyethyl, Para hydroxybenzoic-acid 2-ethylhexyl, the hydroxybenzoic-acid ester of omega-alkyl oligo ethylene oxide, Benzoate derivatives, such as the Para hydroxybenzoic-acid addition product of undecyl glycidyl ether, Propionic-acid ester derivatives, such as ***** (tetrahydro full FURIOKISHI ethyl), An adipate derivative, an azelate derivative, a sebacic-acid ester derivative, A dodecane-2-acid ester derivative, a maleate derivative, a fumaric-acid ester derivative, A TORIMETTO acid ester derivative, citric-acid Tori (butoxy ethoxyethyl), Citric-acid di-n-octyl-monochrome (nonylphenoxyethyl), citric-acid Tori n-octyl, Citric-acid diethyl (tetrahydro full FURIOKISHI ethyl), citric-acid Tori Millis Chill, Citrate derivatives, such as triethyl SHITORETO, an itaconic-acid ester derivative, Oleate derivatives, such as tetrahydrofurfuryl oleate, A ricinoleic-acid ester derivative, a lactic acid (n-butyl), a lactic acid (2-ethylhexyl), A lactic acid (n-butoxy ethoxyethyl), a lactic acid (n-octoxy ethoxyethyl), Lactate derivatives, such as a lactic acid (n-decyloxy ethoxyethyl), Tartaric-acid JI (octoxy ethoxyethyl), a tartaric acid (n-octyl) (nonylphenoxyethyl), Tartrate derivatives, such as tartaric-acid JI (octoxy ethoxyethyl), Salicylate derivatives, such as malic-acid ester derivatives, such as malic-acid dibutoxy ethyl, ***** (n-butoxy ethoxyethyl), malic-acid distearyl, and malic-

acid octadecenyl iso nonyl, and a salicylic-acid addition product of benzyl glycidyl ether, etc. can be illustrated. As a phosphoric ester derivative, moreover, trimethyl phosphate, triethyl phosphate, Tributyl phosphate, tree (2-ethylhexyl) phosphate, 2-ethylhexyl diphenyl phosphate, tributoxyethyl phosphate, Triphenyl phosphate, cresyl diphenyl phosphate, isodecyldiphenylphosphate, Tricesyl phosphate, trixylene phosphat, Tori (chloro ethyl) phosphate, xylene diphenyl phosphate, tetrakis (2, 4-JI tertiary butylphenyl) 4, 4'-biphenylene JIHOSUFONETO, etc. can be illustrated.

[0012] Moreover, as an example of a phosphazene derivative, it is the following general formula (1).

[0013]

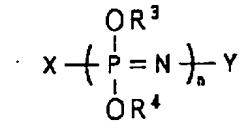
[Formula 1]
一般式(1)



[0014] m shows the integer of 3-25 among [type. It differs and R1 and R2 show the same or the phenyl group which may be permuted by the alkyl group of carbon numbers 1-8, the alkyl group of carbon numbers 1-8, and/or the allyl group.] The annular phosphazene compound, the following general formula (2) which are come out of and expressed

[0015]

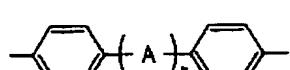
[Formula 2]
一般式(2)



[0016] n shows the integer of 3-1000 among [type. It differs and R3 and R4 show the same or the phenyl group which may be permuted by the alkyl group of carbon numbers 1-8, the alkyl group of carbon numbers 1-8, and/or the allyl group. X shows radical-N=P (OR3)3, radical-N=P (OR4)3, radical-N=P (O) (OR3) or radical-N=P (O), and (OR4). Y — a radical — P (OR3) — four — a radical — P (OR4) — four — a radical — P — (— O —) (OR3) — two — or — a radical — P — (— O —) (OR4) — two — being shown.] At least one sort of phosphazene compounds which came out and were chosen from the straight chain-like phosphazene compounds expressed and these phosphazene compounds are the following general formulas (3) to o-, m- or p-phenylene group, and a biphenylene radical list.

[0017]

[Formula 3]
一般式(3)



[0018] r shows 0 or 1 among [type, and A shows radical -SO₂-, -S-, -O-, or -C(CH₃)₂-.] The phosphazene compound with which the bridge was constructed over between two oxygen atoms with which the alkyl group etc. was desorbed from substituents R1, R2, R3, and R4 by at least one sort of bridge formation radicals chosen from the group which comes out and consists of a radical expressed is mentioned.

[0019] As an example of an annular phosphazene compound expressed with a general formula (1), annular phosphazene compounds, such as hexa phenoxy cyclotriphosphazene, OKUTA phenoxy cyclotetraphosphazene, deca phenoxy cyclopentaphosphazene, hexa propoxy cyclotriphosphazene, OKUTAPUROPOKISHIKISHI cyclotetraphosphazene, and deca propoxy cyclopentaphosphazene, are mentioned.

[0020] Moreover, as an example of a straight chain-like phosphazene compound expressed with a general formula (2), the chain-like phosphazene compound which permuted the propoxy group and/or the phenoxy group by chain-like dichlorophosphazene is mentioned.

[0021] As an example of the structure of cross linkage expressed with a general formula (3), a 4 and 4'-sulfonyl diphenylene (bisphenol-S residue), 4, and 4'-oxydiphenylene radical, 4, and 4'-thio diphenylene radical, 4, and 4'-diphenylene radical etc. can be mentioned, for example.

[0022] The amino group and/or a phenylamino radical may permute these phosphazene derivatives by the location of arbitration. Said one kind may be independently used for these phosphazene derivatives, and two or more sorts of mixture may be used for them. Moreover, you may be the mixture of annular phosphazene and straight chain-like phosphazene.

[0023] Moreover, N-cyclohexyl benzoic-acid amide etc. can be illustrated as a carboxylic amide derivative.

[0024] Moreover, as a sulfonamide derivative, an N-methyl-benzene sulfo amide, N-ethyl benzene sulfo amide, an N-butyl-benzene sulfo amide, an N-cyclohexyl-benzene sulfo amide, an N-ethyl-P-toluene sulfo amide, an N-butyl-toluene sulfo amide, an N-cyclohexyl-toluene sulfo amide, etc. can be illustrated.

[0025] Moreover, benzenesulfonic acid ethyl etc. can be illustrated as a sulfonate derivative. (B) Two or more sorts of mixture which is independent or was chosen from these in one sort chosen from the sulfonamide derivative, the sulfonate derivative, the carboxylic amide derivative, and the carboxylate derivative can be used for a component.

[0026] (C) the compound which is the drugs which have the prevention activity of mites, such as Insecta of various kinds of agricultural noxious insects, a medically important insect, and others, spiders, Acari, and a rat, as drugs which have mite prevention nature, and has mite evasion activity, insect-killing activity, ** tick activity, and ***** activity — the compound which has ***** activity, such as *** activity, youthfully, the compound which has the food intake inhibition activity of a mite, the compound which has the growth control activity of a mite can illustrate.

[0027] As an example of drugs of having this mite prevention nature A chloro nicotinyl system insecticide like imidacloprid, the compound which consists of a neo fill radical which has a silicon atom like silafluofen, Benfuracarb, ARANIKARUBU, methoxy JIAZON, a cull boss fan, Carver mate system compounds, such as fenobucarb, carbaryl, a meso mill, pro POKUSA, and phenoxy KARUBU, Pyrethrin, allethrin, dl, d-T80-allethrin, d-T80-RESUME thorin, Biotechnology allethrin, d-T80-free-wheel-plate RUSURIN, free-wheel-plate RUSURIN, RESUME thorin, FURAME thorin, pro pass phosphorus, permethrin, AKURINA thorin, etofenprox, TORAROME thorin, FENO thorin, d-FENO thorin, fenvalerate, Pyrethroid system compounds, such as en pen thorin, PURARE thorin, tefluthrin, and BENFURUSURIN, A dichloro boss, fenitrothion, diazinon, marathon, promo FOSU, Fenthion, trichlorfon, naled, temephos, FENKUROHOSU, Organic phosphorus system compounds, such as chlorpyrifos methyl, SHIAHOSU, calclofos, aza-MECHIHOSU, pyridaphenthion, pro PETANHOSU, and chlorpyrifos, and these isomers, a derivative, an analog, etc. can be illustrated. Moreover, the compound which has the activity which controls growth of mites, such as methoprene, pyriproxyfen, kino PUREN, hydroprene, DEOHENORAN, NC-170, full FENOROKUSURON, JIFURUBENZURON, RUFENURON, and KURORU azlon, is mentioned. Moreover, as Kelthane, clo RUFENABIRU, DEBUFEMPIRADO pyridaben, MIRUBEME cutin, fenpyroximate, and a rodenticide, scilliroside, NORUBOMAIDO, next door-ized zinc, thallium sulfate, ****, ANTSU, walfarin and a side, a coumarin, a bear tetralin, pro serious ORON, DIFECHIARON, etc. are mentioned as miticide.

[0028] (D) as a fibrous inorganic filler, what has 0.05–10 micrometers of diameters of average fiber and the configuration of 3–150 micrometers of mean fiber length uses preferably — having — for example, 4 potassium titanate fibers, 6 potassium titanate fibers, 8 potassium titanate fibers, titania fiber, monoclinic-system titania fiber, a silica fiber, straw SUTONAITO, xonolite, etc. — it can illustrate — various fillers — independent — or it can mix and use. Also in these fibrous inorganic bulking agents, especially 8 potassium titanate fibers are desirable. Since it can raise sustained-release further if a fibrous inorganic filler is blended, it is desirable. Moreover, combination of a fibrous inorganic filler is desirable in order to contribute mechanical physical properties also to improvement.

[0029] Even if it remains as it is, it can be used, but in order that a fibrous inorganic filler may raise an interface adhesive property with resin and may raise mechanical physical properties further, by finishing agents, such as silane coupling agents, such as an amino silane, an epoxy silane, and an acrylic silane, or a titanate coupling agent, surface treatment of it may be carried out and it may be used.

[0030] In the resin constituent of this invention, it is the range which does not spoil the purpose of this invention, and inorganic fillers, such as a zeolite, can also be used together.

[0031] although it can set up suitably by the component chosen concretely as the blending ratio of coal of each component in the resin constituent of this invention — usually — the (A) component 100 weight section — receiving — the (B) component 0.05 – the 100 weight sections — it is preferably good 2 – 50 weight section, the (C) component 0.01 – 30 weight sections, and for 0.1 – 20 weight section to come out comparatively preferably, and to blend.

[0032] Moreover, when blending the (D) component, the loadings are good to consider as 2 – 60 weight section to the (A) component 100 weight section. (D) If the loadings of a component exceed 60 weight sections, since shaping will become difficult, if less than 2 weight sections, the effectiveness which blends a fibrous inorganic filler will not be acquired enough preferably.

[0033] The mite prevention nature resin constituent of this invention can be manufactured by blending for example, each component and carrying out melting kneading. Combination of each component can be performed by blending dryly using a tumbler, a blender, a mixer, etc. beforehand, and can also perform [supply / of a kneading machine / from a different hopper / the same or] each component. The mite prevention nature resin constituent of obtained this invention is fabricated in the configuration of a direct request, it may be kept, and it being good also as a mite prevention nature member, and once pelletizing by the pelletizer after extrusion etc. may carry out and circulate it. What was made into the pellet etc. can be fabricated by the well-known approach.

[0034] On the occasion of shaping of the mite prevention nature resin constituent of this invention, it can fabricate by various kinds of well-known shaping approaches, for example, injection molding, extrusion molding, press forming, blow molding, machining shaping, etc. can be illustrated as this shaping approach. As a configuration of the mite prevention nature member of this invention, there is especially no limit and plate-like, a cylinder, cylindrical, Kushigata, a globular form, etc. can make it all configurations. Moreover, with the usual resin constituent metallurgy group etc., multi-color molding can be carried out and a request part can also use the mite prevention nature resin

constituent of this invention as a two color thru/or the structural member which has mite prevention nature.

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EXAMPLE

[Example] An example and the example of a comparison are hung up over below, and this invention is further explained to a detail.

[0036] Examples 1-3 and 1-445mm phi twin screw extruder of examples of a comparison are used, and it is set as the resin temperature of 190 degrees C, and is the (A) component (a polyamide 12 is used as polyamide resin.) from the Maine hopper. The trade name "die amide L1940" die cel Huels, Inc. make. It supplies and the column of the class of front Naka is made to carry out melting of the display to "PA." The (B) component of the rate shown in following Table 1 or 2 with a plunger pump from a twin screw extruder side hopper (an N-butyl-benzene sulfo amide is used as a sulfonamide derivative.) the column of the class of front Naka — "A", a display, and the (C) component (permethrin is used as an insecticide.) In the column of the class of front Naka, the mixture of "A" and a display was pressed fit, was pelletized continuously, and the resin constituent of examples 1-3 and the examples 1-4 of a comparison was obtained. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet. However, drugs are carrying out bleed out of the resin constituent of the example 4 of a comparison to the pellet front face, and shaping of an injection-molded product was not able to do it.

[0037]

[Table 1]

種類	(A) 成分		(B) 成分		(C) 成分		(D) 成分		殺虫活性			
	配合量	種類	配合量	種類	配合量	種類	配合量	種類	配合量	7日	3ヶ月	6ヶ月
実施例1	PA	80	A	15	A	5	—	—	—	O	△	X
実施例2	PA	75	A	15	A	10	—	—	—	O	○	X
実施例3	PA	65	A	15	A	20	—	—	—	O	△	X
実施例4	POM	85	A	10	A	5	—	—	—	O	△	X
実施例5	POM	80	A	10	A	10	—	—	—	O	○	△
実施例6	POM	70	A	10	A	20	—	—	—	O	○	△
実施例7	PA	80	A	15	B	5	—	—	—	O	△	X
実施例8	PA	75	A	15	B	10	—	—	—	O	△	△
実施例9	PA	65	A	15	B	20	—	—	—	O	△	△
実施例10	PA	80	B	15	A	5	—	—	—	O	△	X
実施例11	PA	75	B	15	A	10	—	—	—	O	△	△
実施例12	PA	65	B	15	A	20	—	—	—	O	△	△
実施例13	PA	80	C	15	A	5	—	—	—	O	△	X
実施例14	PA	75	C	15	A	10	—	—	—	O	△	△
実施例15	PA	65	C	15	A	20	—	—	—	O	○	△
実施例16	PA	70	A	15	A	5	A	A	10	O	○	△
実施例17	PA	60	A	15	A	5	A	A	20	O	○	△
実施例18	PA	65	A	15	A	10	A	A	10	O	○	○
実施例19	PA	55	A	15	A	10	A	A	20	O	○	○
実施例20	PA	55	A	15	A	20	A	A	10	O	○	○
実施例21	PA	45	A	15	A	20	A	A	20	O	○	○

[0038]

[Table 2]

種類	(A) 成分		(B) 成分		(C) 成分		(D) 成分		殺虫活性			
	配合量	種類	配合量	種類	配合量	種類	配合量	種類	配合量	7日	3ヶ月	6ヶ月
比較例1	PA	85	A	15	—	D	—	—	—	X	—	—
比較例2	PA	95	—	0	A	5	—	—	—	O	X	—
比較例3	PA	90	—	0	A	10	—	—	—	O	X	—
比較例4	PA	80	—	0	A	20	—	—	—	—	—	—
比較例5	POM	90	A	10	—	0	—	—	—	X	—	—
比較例6	PP	80	—	0	A	20	—	—	—	—	—	—
比較例7	EVA	80	—	0	A	20	—	—	—	—	—	—

[0039] Examples 4-6 and 545mm phi twin screw extruder of examples of a comparison are used, and it is set as the resin temperature of 185 degrees C, and is the (A) component (polyacetal resin.) from the Maine hopper. A trade

name "Duracon M90-44", Polyplastics, Inc. make. It supplies and the column of the class of front Naka is made to carry out melting of the display to "POM." From the twin screw extruder side hopper, with the plunger pump, it pressed fit, and the mixture of the (B) component (an N-butyl-benzene sulfo amide is used as a sulfonamide derivative) of the rate shown in Table 1 or 2 and the (C) component (it considers as an insecticide and permethrin is used) was pelletized continuously, and the resin constituent of examples 4-6 and the example 5 of a comparison was obtained. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

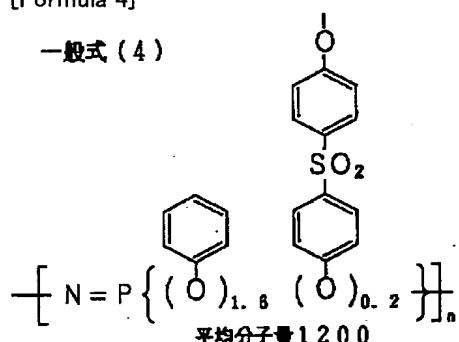
[0040] It is methoxy JIAZON (insecticide.) about an examples 7-9 (C) component. It changed to the column of the class of front Naka at "B" and a display, and also the resin constituent of examples 7-9 was obtained like the example 1. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

[0041] It is Para hydroxybenzoic-acid 2-ethylhexyl (carboxylate derivative.) about an examples 10-12 (B) component. It changed to the column of the class of front Naka at "B" and a display, and also the resin constituent of examples 10-12 was obtained like the example 1. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

[0042] The examples 13-15 (B) component was changed to the phosphazene system compound (it is displayed on the column of the class of front Naka as "C") expressed with the following general formula (4), and also the resin constituent of examples 13-15 and the example 8 of a comparison was obtained like the example 1. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

[0043]

[Formula 4]



[0044] 16-2145mm phi twin screw extruder of examples is used, and it is set as the resin temperature of 190 degrees C, and is A component (the same polyamide resin as an example 1 is used.) from the Maine hopper. It supplies and melting of the trade name "the die amide L1940" is carried out. From a twin screw extruder side hopper, the mixture of the (B) component (N-butylbenzene sulfonic-acid amide is used as a sulfonamide derivative) of the rate shown in Table 1 with a plunger pump and the (C) component (it considers as an insecticide and permethrin is used) is pressed fit, and it is the (D) component (0.5 micrometers of diameters of average fiber and 8 potassium titanate fibers of 18 micrometers of mean fiber length are used as a fibrous inorganic filler.) further. The trade name "TISUMO D" Otsuka chemistry incorporated company make. Side feed of the display was carried out to "A" at the column of the class of front Naka. Then, it pelletized and the resin constituent of examples 16-21 was obtained. Moreover, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine with the injection molding machine using the obtained pellet.

[0045] 645mm phi twin screw extruder of examples of a comparison is used, and it is set as the resin temperature of 240 degrees C, and is polypropylene resin (a trade name "UBE polypropylene", Ube Industries, Ltd. make.) from the Maine hopper. For convenience, it sets in the column of the class of front Naka (A) component, and it supplies and melting of the display 80 weight section is carried out to "PP." From the twin screw extruder side hopper, with the plunger pump, it pressed fit, and the (C) component (permethrin is used as an insecticide) of 20 weight sections was pelletized continuously, and the resin constituent of the example 6 of a comparison was obtained. About the resin constituent of the example 6 of a comparison as well as each example, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine.

[0046] 745mm phi twin screw extruder of examples of a comparison is used, and it is set as the resin temperature of 150 degrees C, and is ethylene vinyl acetate system resin (the 32 % of the weight [of vinyl acetate contents], and trade name "URUTORASEN 750" Oriental soda industrial incorporated company make.) from the Maine hopper. For convenience, it sets in the column of the class of front Naka (A) component, and it supplies and melting of the display 80 weight section is carried out to "EVA." From the twin screw extruder side hopper, with the plunger pump,

it pressed fit, and the (C) component (permethrin is used as an insecticide) of 20 weight sections was pelletized continuously, and the resin constituent of the example 7 of a comparison was obtained. About the resin constituent of the example 7 of a comparison as well as each example, the mold goods for a cylindrical test with bore 15mmphi, a thickness [of 1.5mm], and a die length of 40mm were created with the injection molding machine.

[0047] The mold goods for a test obtained in example of trial 1 each example and the example of a comparison were set by the 25-degree C environment, the gauze (the Toray Industries, Inc. make, trade name "Dacron C-119 sky Larc") was attached in the both ends of the mold goods for a test for the 3rd month in the 6th month on the 7th, five specimens which shut up one KUSAGUMO (Agelena limbata) were created respectively, and the life and death of KUSAGUMO of 24 hours after were checked. It was judged that the life and death of KUSAGUMO were dead when a stimulus is given to KUSAGUMO with pincettes and there is no reaction. A result is shown in Table 1 and 2. In addition, the rate of a specimen to all specimens (five pieces) of having died estimated evaluation of the insect-killing activity in Table 1 and 2. Front Naka, O — 80% or more of death rates of KUSAGUMO, ** — Less than 80% of 40% or more of death rates of KUSAGUMO, x — Less than 40% of death rates of KUSAGUMO is shown.

[0048] The test piece was created with injection molding using the resin constituent of example of trial 2 examples 1 and 4, and the examples 6 and 7 of a comparison, and tensile strength (ASTM D638), flexural strength (ASTM D790), heat deflection temperature (ASTM D648, 4.6kg/cm²), and gasoline-proof nature were examined. in addition, gasoline-proof nature measured the die length of the test piece immediately after being immersed in a gasoline (Idemitsu petroleum incorporated company make, regular gasoline) at 25 degrees C, and taking out a test piece (bore 15mmphi, the thickness of 1.5mm, and die length of 40mm — cylindrical) 24 hours after, and evaluated it by the rate of a dimensional change before and behind immersion. A result is shown in Table 3. In addition, inside of Table 3, O — Less than 0.2% of rates of a dimensional change, ** — 0.2% or more of rates of a dimensional change, x — The dissolution is shown.

[0049]

[Table 3]

	引張強度 (kgf/cm ²)	曲げ強度 (kgf/cm ³)	熱たわみ温度 (°C)	耐ガソリン性
実施例1	370	600	135	○
実施例4	550	800	145	○
比較例6	330	400	108	△
比較例7	<50	<50	<40	×

[0050] All the mold goods of each example have insect-killing activity, and especially the mold goods with which the fibrous inorganic filler was blended are excellent in sustained-release so that clearly from the above-mentioned examples 1 and 2 of a trial. Moreover, the mold goods of an example fully have reinforcement, thermal resistance, etc.

[0051]

[Translation done.]

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(54)【発明の名称】 小動物防除性樹脂組成物及び該樹脂組成物を成形してなる小動物防除性部材

(57)【要約】

【課題】 本発明は、構造材料等として用いられる樹脂材料であつて、強度、耐熱性及び耐薬品性を有するとともに小動物を防除する性能を長期に亘って発現し得る樹脂組成物を提供することを課題とする。

【解決手段】 (A) ポリアミド樹脂、ポリアセタール樹脂より選ばれる少なくとも1種の樹脂、(B) スルホニアミド誘導体、スルホン酸エステル誘導体、リン酸エステル誘導体、ホスファゼン誘導体、カルボン酸アミド誘導体、カルボン酸エステル誘導体より選ばれる少なくとも1種の化合物、及び(C) 小動物防除性を有する薬剤を含有する小動物防除性樹脂組成物を解決手段とする。

【特許請求の範囲】

【請求項1】 (A) ポリアミド樹脂、ポリアセタール樹脂より選ばれる少なくとも1種の樹脂、(B) スルホンアミド誘導体、スルホン酸エステル誘導体、リン酸エステル誘導体、ホスファゼン誘導体、カルボン酸アミド誘導体、カルボン酸エステル誘導体より選ばれる少なくとも1種の化合物、及び(C) 小動物防除性を有する薬剤を含有することを特徴とする小動物防除性樹脂組成物。

【請求項2】 更に(D) 繊維状無機充填材が配合されてなる請求項1記載の小動物防除性樹脂組成物。

【請求項3】 請求項1又は2記載の小動物防除性樹脂組成物を成形してなることを特徴とする小動物防除性部材。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、小動物防除性樹脂組成物及び該樹脂組成物を成形してなる小動物防除性部材に関する。

【0002】

【従来の技術及び発明が解決しようとする課題】電気機器や輸送機器等においては、虫等の機器内への侵入に起因する故障や障害が問題となっている。例えば、テレビ受像機においては、機器内の温熱に誘引されて昆虫類や蜘蛛等の小動物が機器背部の小孔より侵入し、回路を短絡させる等して故障の原因となることがあった。また、精密コンピューターや電話交換器、産業用ロボット等においても、機器内部に昆虫等が侵入し障害発生の原因となることがあった。

【0003】斯かる問題を解消するため機器等の構造部材、外装部材、流体輸送管、駆動部材等として用いられる樹脂材料に小動物防除性物質を担持させることが考えられる。小動物防除性を有する樹脂材料としては、これまでに、直鎖状低分子量ポリエチレン樹脂、ポリプロピレン樹脂及びポリ塩化ビニル樹脂等の軟質な樹脂をマトリックス樹脂とし、殺虫剤等を配合してなる樹脂組成物が提案されている。これらの樹脂は、殺虫剤等の薬剤を大量に保持し得る樹脂であるが、反面、強度、耐熱性及び耐薬品性等において不十分であるという欠点を有している。そのため、該樹脂組成物自体を成形材料として成形してなる部材は、その使用場面が極めて限定されるものであり、強度を殆ど必要としない用途、例えばネコの首輪等への採用が可能であるに過ぎない(特開平6-315332号、特開平5-284871号、特開平6-141724号等参照)。

【0004】また、耐熱性や耐薬品性に優れた樹脂である、所謂エンジニアリングプラスチックスにおいては、これらの樹脂が、通常、前記薬剤を担持する能力に劣るため、薬剤を配合しても徐放性を示さず、全く小動物防除効果を発現しなかったり、或いは初期効果は発現する

ものの短期間で小動物防除効果が消滅してしまうといった欠点を有している。

【0005】本発明は、斯かる従来技術の課題に鑑み、構造材料等として用いられる樹脂材料であって、強度、耐熱性及び耐薬品性を有するとともに小動物防除性能を長期に亘って発現し得る樹脂組成物を提供することを課題とする。

【0006】

【課題を解決するための手段】即ち、本発明は、(A) ポリアミド樹脂、ポリアセタール樹脂より選ばれる少なくとも1種の樹脂(以下、単に「A成分」という場合がある)、(B) スルホンアミド誘導体、スルホン酸エ斯特ル誘導体、リン酸エ斯特ル誘導体、ホスファゼン誘導体、カルボン酸アミド誘導体、カルボン酸エ斯特ル誘導体より選ばれる少なくとも1種の化合物(以下、単に「B成分」という場合がある)、及び(C) 小動物防除性を有する薬剤(以下、単に「C成分」という場合がある)を含有する小動物防除性樹脂組成物に係る。また、本発明は、更に(D) 繊維状無機充填材(以下、単に「D成分」という場合がある)が配合されてなる請求項1の小動物防除性樹脂組成物に係る。また、本発明は、前記何れかの小動物防除性樹脂組成物を成形してなる小動物防除性部材に係る。

【0007】

【発明の実施の形態】本発明において、(A) ポリアミド樹脂、ポリアセタール樹脂より選ばれる少なくとも1種の樹脂のうち、ポリアミド樹脂の具体例としては、ポリアミド6、ポリアミド66、ポリアミド11、ポリアミド12樹脂等のポリアミド樹脂、ポリアミドMXD、ポリアミド6T樹脂等の芳香族ポリアミド樹脂を例示できる。

【0008】また、ポリアセタール樹脂の具体例としては、オキシメチレン単位のみからなる単独重合体の他、オキシメチレン単位を主成分とし、これに副成分としてオキシエチレン単位等の他の共重合単位を含む共重合体、これらを架橋させてなる架橋重合体、またはグラフト共重合させてなるグラフト共重合体を例示できる。

(A) 成分は、ポリアミド樹脂若しくはポリアセタール樹脂から選ばれた1種を単独で、又はこれらから選ばれた2種以上の混合物を用いることができる。

【0009】本発明において(A)成分として用いられるポリアミド樹脂又はポリアセタール樹脂は、本発明の効果を損なわない限り他の樹脂とのアロイとして用いてよい。斯かるアロイにおいて、他の樹脂として採用可能な樹脂としては、ポリエチレン、ポリプロピレン、ポリスチレン、アクリロニトリル-バージェン-ステレン樹脂、ポリエチレンテレフタレート、ポリブチレンテレフタレート、ポリカーボネート、ポリアリレート、ポリフェニレンエーテル、熱可塑性ポリウレタン、液晶性ポリエステル等を挙げられ、これらは(A)成分中に70

重量部未満の割合で配合して用いることができる。

【0010】(B) スルホンアミド誘導体、スルホン酸エステル誘導体、カルボン酸アミド誘導体、カルボン酸エステル誘導体より選ばれる少なくとも1種の化合物は、(C) 成分を溶解保持し、徐放性を付与する作用を有するものと考えられる。斯かる(B)成分のうち、カルボン酸エ斯特ル誘導体としては、水酸基、ニトロ基、アミノ基、エポキシ基、ハログン等で置換されてもよい各種カルボン酸のアルキルエステル、芳香族エ斯特ル等を例示でき、水酸基やエポキシ基を有するものはポリアミドとの相溶性が良好であるため好ましい。

【0011】カルボン酸エ斯特ル誘導体の具体例としては、例えばジメチルフタレート、ジエチルフタレート、ジエトオクチルフタレート、ジフェニルフタレート、ベンジルフタレート、ジメトキシエチルフタレート、4, 5-エポキシヘキサヒドロフタル酸ジ(2-エチルヘキシル)、4, 5-エポキシシクロヘキサヒドロフタル酸ジ(7, 8-エポキシ-2-オクテニル)、4, 5-エポキシシクロヘキサヒドロフタル酸ジ(9, 10-エポキシオクタデシル)、4, 5-エポキシシクロヘキサヒドロフタル酸ジ(10, 11-エポキシウンデシル)、フタル酸ジ(テトラヒドロフルフリロキシエチル)、各種フタル酸混合エ斯特ル及びフタル酸混合エ斯特ルのエチレンオキシド付加物等のフタル酸エ斯特ル誘導体、イソフタル酸エ斯特ル誘導体、テトラヒドロフタル酸エ斯特ル誘導体、バラヒドロキシ安息香酸ブトキシエチル、バラヒドロキシ安息香酸シクロヘキシロキシエトキシエトキシエチル、バラヒドロキシ安息香酸2-エチルヘキシル、 ω -アルキルオリゴエチレンオキシドのヒドロキシ安息香酸エ斯特ル、ウンデシルグリシジルエーテルのバラヒドロキシ安息香酸付加物等の安息香酸エ斯特ル誘導体、チオジプロビオン酸ジ(テトラヒドロフルフリロキシエチル)等のプロビオン酸エ斯特ル誘導体、アジピン酸エ斯特ル誘導体、アゼライン酸エ斯特ル誘導体、セバシン酸エ斯特ル誘導体、ドデカン-2-酸エ斯特ル誘導体、マレイン酸エ斯特ル誘導体、フマル酸エ斯特ル誘導体、トリメット酸エ斯特ル誘導体、クエン酸トリ(ブトキシエトキシエチル)、クエン酸ジ η -オクチルモノ(ノニルフェノキシエチル)、クエン酸トリ n -オクチル、クエン酸ジオクチル(テトラヒドロフルフリロキシエチル)、クエン酸トリミリストル、トリエチルシトレート等のクエン酸エ斯特ル誘導体、イタコン酸エ斯特ル誘導体、オレイン酸テトラヒドロフルフリル等のオレイン酸エ斯特ル誘導体、リシノール酸エ斯特ル誘導体、乳酸(n -ブチル)、乳酸(2-エチルヘキシル)、乳酸(n -ブトキシエトキシエチル)、乳酸(n -オクトキシエトキシエチル)、乳酸(n -デシルオキシエトキシエチル)等の乳酸エ斯特ル誘導体、酒石酸ジ(オクトキシエトキシエチル)、酒石酸(n -オクチル)(ノニルフェノキシエチル)、酒石酸ジ(オクト

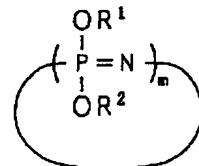
キシエトキシエチル)等の酒石酸エ斯特ル誘導体、リンゴ酸ジブトキシエチル、リンゴ酸ジ(n -ブトキシエトキシエチル)、リンゴ酸ジステアリル、リンゴ酸オクタデセニルイソノニル等のリンゴ酸エ斯特ル誘導体、ベンジルグリシジルエーテルのサリチル酸付加物等のサリチル酸エ斯特ル誘導体等を例示できる。また、リン酸エ斯特ル誘導体としては、トリメチルホスフェート、トリエチルホスフェート、トリブチルホスフェート、トリ-(2-エチルヘキシル)ホスフェート、2-エチルヘキシル・ジフェニル・ホスフェート、トリブトキシエチルホスフェート、トリフェニルホスフェート、クレジルジフェニルホスフェート、イソデシル・ジフェニル・ホスフェート、トリクレジル・ホスフェート、トリキシレニル・ホスフェート、トリ(クロロエチル)ホスフェート、キシレニル・ジフェニルホスフェート、テトラキス(2, 4-ジ第三ブチルフェニル)4, 4'-ビフェニレンジホスフォネート等を例示できる。

【0012】また、ホスファゼン誘導体の具体例としては、下記一般式(1)

【0013】

【化1】

一般式(1)

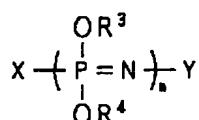


【0014】〔式中、mは3~25の整数を示す。R¹、R²は同一又は異なって炭素数1~8のアルキル基、炭素数1~8のアルキル基及び/又はアリル基で置換されていてもよいフェニル基を示す。〕で表わされる環状ホスファゼン化合物、下記一般式(2)

【0015】

【化2】

一般式(2)



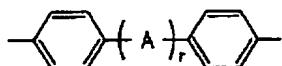
【0016】〔式中、nは3~1000の整数を示す。R¹、R²は同一又は異なって炭素数1~8のアルキル基、炭素数1~8のアルキル基及び/又はアリル基で置換されていてもよいフェニル基を示す。Xは基-N=P(OR³)、基-N=P(OR¹)、基-N=P(O)OR¹又は基-N=P(O)(OR¹)を示す。Yは基-P(OR³)、基-P(OR¹)、基-P(O)OR¹又は基-P(O)(OR¹)を示す。〕で表わされる直鎖状ホスファゼン化合物、及び、これらのホ

スファゼン化合物より選ばれた少なくとも1種のホスファゼン化合物が、o-、m-又はp-フェニレン基、ビフェニレン基並びに下記一般式(3)

【0017】

【化3】

一般式(3)



【0018】〔式中、rは0又は1を、Aは基 $-SO_2-$ 、 $-S-$ 、 $-O-$ 又は $-C(CH_3)_2-$ を示す。〕

で表わされる基よりなる群より選ばれた少なくとも1種の架橋基により、置換基R¹、R²、R³、R⁴からアルキル基等が脱離した2個の酸素原子間が架橋されたホスファゼン化合物が挙げられる。

【0019】一般式(1)で表わされる環状ホスファゼン化合物の具体例としては、ヘキサフェノキシシクロトリホスファゼン、オクタフェノキシシクロテトラホスファゼン、デカフェノキシシクロペンタホスファゼン、ヘキサプロポキシシクロトリホスファゼン、オクタプロポキシシシクロテトラホスファゼン、デカプロポキシシクロペンタホスファゼン等の環状ホスファゼン化合物が挙げられる。

【0020】また、一般式(2)で表わされる直鎖状ホスファゼン化合物の具体例としては、鎖状ジクロルホスファゼンにプロポキシ基及び/又はフェノキシ基を置換した鎖状ホスファゼン化合物が挙げられる。

【0021】一般式(3)で表される架構構造の具体例としては、例えば4,4'-ースルホニルジフェニレン(ビスフェノール-S残基)、4,4'-オキシジフェニレン基、4,4'-チオジフェニレン基、4,4'-ジフェニレン基等を挙げることができる。

【0022】これらのホスファゼン誘導体は、任意の位置にアミノ基及び/又はフェニルアミノ基が置換したものであってもよい。これらのホスファゼン誘導体は、前記1種類を単独で用いてもよく、2種以上の混合物を用いてもよい。また環状ホスファゼンと直鎖状ホスファゼンの混合物であってもよい。

【0023】また、カルボン酸アミド誘導体としては、N-シクロヘキシル安息香酸アミド等を例示できる。

【0024】また、スルホンアミド誘導体としては、N-メチルベンゼンスルホアミド、N-エチルベンゼンスルホアミド、N-ブチルベンゼンスルホアミド、N-シクロヘキシルベンゼンスルホアミド、N-エチル-P-トルエンスルホアミド、N-ブチル-トルエンスルホアミド、N-シクロヘキシル-トルエンスルホアミド等を例示できる。

【0025】また、スルホン酸エステル誘導体としては、ベンゼンスルホン酸エチル等を例示できる。(B)成分は、スルホンアミド誘導体、スルホン酸エステル誘

導体、カルボン酸アミド誘導体、カルボン酸エステル誘導体から選ばれた1種を単独で、又はこれらから選ばれた2種以上の混合物を用いることができる。

【0026】(C)小動物防除性を有する薬剤としては、各種の農業害虫、衛生害虫その他の昆虫類、蜘蛛類、ダニ類、鼠等の小動物の防除活性を有する薬剤であり、小動物忌避活性を有する化合物、殺虫活性、殺ダニ活性、殺蜘蛛活性若くは殺鼠活性等の殺小動物活性を有する化合物、小動物の摂食阻害活性を有する化合物、小動物の成長コントロール活性を有する化合物等を例示できる。

【0027】斯かる小動物防除性を有する薬剤の具体例としては、イミダクロブリドの様なクロロニコチニル系殺虫剤、シラフルオフェンの様なケイ素原子を有するネオフィルラジカルからなる化合物、ベンフラカルブ、アラニカルブ、メトキシジアゾン、カルボスファン、フェノブカルブ、カルバリル、メソミル、プロポクサー、フェノキシカルブ等のカーバメート系化合物、ビレトリン、アレスリン、d1,d-T80-アレスリン、d-T80-レスメトリントリ、バイオアレスリン、d-T80-フタルスリン、フタルスリン、レスメトリントリ、フラメトリントリ、プロバスリントリ、ペルメトリントリ、アクリナトリン、エトフェンプロックス、トラロメトリントリ、フェノトリン、d-フェノトリン、フェンバレート、エンペントリン、ブレトリン、テフルスリン、ベンフルスリン等のビレスロイド系化合物、ジクロロボス、フェニトロチオン、ダイアジノン、マラソン、プロモフォス、フェンチオン、トリクロルホン、ナレド、テメホス、フェンクロホス、クロルビリホスメチル、シアホス、カルクロホス、アザメチホス、ビリダフェンチオン、プロペタンホス、クロルビリホス等の有機リン系化合物及びこれらの異性体、誘導体、類縁体等を例示できる。また、メトブレン、ヒリブロキシフェン、キノブレン、ハイドロブレン、デオヘノラン、NC-170、フルフェノロクスロン、ジフルベンズロン、ルフェヌロン、クロルアズロン等の小動物の成長をコントロールする活性を有する化合物が挙げられる。また、殺ダニ剤としてケルセン、クロルフェナビル、デブフェンピラドビリダベン、ミルベメクチン、フェンピロキシメート、殺鼠剤としてはシリロシド、ノルボマイド、磷化亜鉛、硫酸タリウム、貴隣、アンツー、ワルファリン、エンドサイド、クマリン、クマテトラリン、プロマジオロン、ディフェチアロン等が挙げられる。

【0028】(D)纖維状無機充填材としては、平均纖維径0.05~10μm、平均纖維長3~150μmの形状を有するものが好ましく用いられ、例えば、4チタン酸カリウム纖維、6チタン酸カリウム纖維、8チタン酸カリウム纖維、チタニア纖維、单斜晶系チタニア纖維、シリカ纖維、ワラストナイト、ゾノライト等を例示でき、各種充填材を単独で又は混合して用いることができる。これらの纖維状無機充填剤の中でも、8チタン

酸カリウム繊維が特に好ましい。繊維状無機充填材を配合すると徐放性を一層高めることができるため好ましい。また、繊維状無機充填材の配合は機械的物性を向上にも寄与するため好ましい。

【0029】繊維状無機充填材はそのままでも使用し得るが、樹脂との界面接着性を向上させ機械的物性を一層向上させるために、アミノシラン、エポキシシラン、アクリルシラン等のシランカップリング剤又はチタネートカップリング剤等の表面処理剤で表面処理して用いてよい。

【0030】本発明の樹脂組成物においては、本発明の目的を損なわない範囲で、ゼオライト等の無機充填材を併用することもできる。

【0031】本発明の樹脂組成物における各成分の配合割合としては、具体的に選択する成分により適宜設定できるが、通常、(A) 成分100重量部に対して(B) 成分0.05~100重量部、好ましくは2~50重量部、(C) 成分0.01~30重量部、好ましくは0.1~20重量部の割合で配合するのがよい。

【0032】また、(D) 成分を配合する場合、その配合量は、(A) 成分100重量部に対して2~60重量部とするのがよい。(D) 成分の配合量が60重量部を上回ると、成形が困難となるため好ましくなく、2重量部を下回ると繊維状無機充填材を配合する効果が十分得られない。

【0033】本発明の小動物防除性樹脂組成物は、例えば各成分を配合し、溶融混練することにより製造できる。各成分の配合は、予めタンブラー、ブレンダー、ミキサー等を用いて乾式混合することにより行うことができ、また、各成分を混練機の同一又は異なったホッパーから供給することにより行うともできる。得られた本発明の小動物防除性樹脂組成物は直接所望の形状に成形し小動物防除性部材としてもよいし、一旦、押出後、ペレタイザーによりペレット化する等して、保管、流通させててもよい。ペレット等としたものは、公知の方法によ

り、成形することができる。

【0034】本発明の小動物防除性樹脂組成物の成形に際しては、公知の各種の成形方法により成形することができ、例えば、斯かる成形方法としては射出成形、押出成形、プレス成形、ブロー成形、マシニング成形等を例示できる。本発明の小動物防除性部材の形状としては、特に制限はなく、平板状、棒状、円筒状、樹形、球形等あらゆる形状とすることができます。また、本発明の小動物防除性樹脂組成物は、通常の樹脂組成物や金属等とともに二色乃至多色成形して所望部分が小動物防除性を有する構造部材等とすることもできる。

【0035】

【実施例】以下に実施例及び比較例を掲げ、本発明を更に詳細に説明する。

【0036】実施例1~3及び比較例1~4

45mmφ二軸押出機を使用して、樹脂温度190°Cに設定し、メインホッパーより(A)成分(ポリアミド樹脂としてポリアミド12を使用。商品名「ダイアミドL1940」、ダイセル・ヒュルス株式会社製。表中の種類の欄に「PA」と表示)を投入、溶融させる。二軸押出機サイドホッパーより、プランジャーポンプにて下記表1又は表2に示す割合の(B)成分(スルホンアミド誘導体としてN-ブチルベンゼンスルホアミドを使用。表中の種類の欄に「A」と表示)及び(C)成分(殺虫剤としてペルメトリシンを使用。表中の種類の欄に「A」と表示)の混合物を圧入し、続いてペレット化して実施例1~3及び比較例1~4の樹脂組成物を得た。また、得られたペレットを用いて射出成形機により、内径15mmφ、肉厚1.5mm、長さ40mmの円筒状テスト用成形品を射出成形機にて作成した。但し、比較例4の樹脂組成物はペレット表面に薬剤がブリードアウトしており、射出成形品の成形ができなかった。

【0037】

【表1】

	(A) 成分		(B) 成分		(C) 成分		(D) 成分		殺虫活性		
	種類	配合量	種類	配合量	種類	配合量	種類	配合量	7日	3ヶ月	6ヶ月
実施例1	PA	80	A	15	A	5	—	—	○	△	×
実施例2	PA	75	A	15	A	10	—	—	○	○	×
実施例3	PA	65	A	15	A	20	—	—	○	○	×
実施例4	POM	85	A	10	A	5	—	—	○	△	×
実施例5	POM	80	A	10	A	10	—	—	○	○	×
実施例6	POM	70	A	10	A	20	—	—	○	○	△
実施例7	PA	80	A	15	B	5	—	—	○	△	×
実施例8	PA	75	A	15	B	10	—	—	○	△	×
実施例9	PA	65	A	15	B	20	—	—	○	△	△
実施例10	PA	80	B	15	A	5	—	—	○	△	×
実施例11	PA	75	B	15	A	10	—	—	○	△	△
実施例12	PA	65	B	15	A	20	—	—	○	○	△
実施例13	PA	80	C	15	A	5	—	—	○	△	△
実施例14	PA	75	C	15	A	10	—	—	○	○	△
実施例15	PA	65	C	15	A	20	—	—	○	○	△
実施例16	PA	70	A	15	A	5	A	10	○	○	△
実施例17	PA	60	A	15	A	5	A	20	○	○	○
実施例18	PA	65	A	15	A	10	A	10	○	○	○
実施例19	PA	55	A	15	A	10	A	20	○	○	○
実施例20	PA	55	A	15	A	20	A	10	○	○	○
実施例21	PA	45	A	15	A	20	A	20	○	○	○

【0038】

【表2】

	(A) 成分		(B) 成分		(C) 成分		(D) 成分		殺虫活性		
	種類	配合量	種類	配合量	種類	配合量	種類	配合量	7日	3ヶ月	6ヶ月
比較例1	PA	85	A	15	—	0	—	—	X	—	—
比較例2	PA	95	—	0	A	5	—	—	○	×	—
比較例3	PA	90	—	0	A	10	—	—	○	×	—
比較例4	PA	80	—	0	A	20	—	—	—	—	—
比較例5	POM	90	A	10	—	0	—	—	X	—	—
比較例6	PP	80	—	0	A	20	—	—	—	—	—
比較例7	EVA	80	—	0	A	20	—	—	—	—	—

【0039】実施例4～6及び比較例5

4.5 mmの二軸押出機を使用して、樹脂温度185°Cに設定し、メインホッパーより(A)成分(ポリアセタール樹脂。商品名「ジュラコンM90-44」、ポリプラスチックス株式会社製。表中の種類の欄に「POM」と表示)を投入、溶融させる。二軸押出機サイドホッパーより、ブランジャーポンプにて表1又は表2に示す割合の(B)成分(スルホンアミド誘導体としてN-ブチル-1-ベンゼンゼンスルホアミドを使用)及び(C)成分(殺虫剤としてペルメトリンを使用)の混合物を圧入し、続いてペレット化して実施例4～6及び比較例5の樹脂組成物を得た。また、得られたペレットを用いて射出成形機により、内径15mmの、肉厚1.5mm、長さ40mmの円筒状テスト用成形品を射出成形機にて作成した。

【0040】実施例7～9

(C)成分をメトキシジアゾン(殺虫剤。表中の種類の欄に「B」と表示)に替えた他は実施例1と同様にして実施例7～9の樹脂組成物を得た。また、得られたペレットを用いて射出成形機により、内径15mmの、肉厚1.5mm、長さ40mmの円筒状テスト用成形品を射出成形機にて作成した。

【0041】実施例10～12

(B)成分をパラヒドロキシ安息香酸2-エチルヘキシル(カルボン酸エステル誘導体。表中の種類の欄に「B」と表示)に替えた他は実施例1と同様にして実施

例10～12の樹脂組成物を得た。また、得られたペレットを用いて射出成形機により、内径15mmの、肉厚1.5mm、長さ40mmの円筒状テスト用成形品を射出成形機にて作成した。

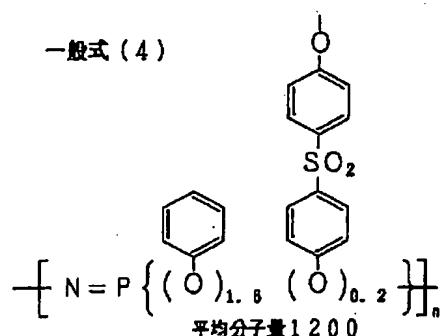
【0042】実施例13～15

(B)成分を下記一般式(4)で表わされるホスファゼン系化合物(表中の種類の欄に「C」と表示)に替えた他は実施例1と同様にして実施例13～15及び比較例8の樹脂組成物を得た。また、得られたペレットを用いて射出成形機により、内径15mmの、肉厚1.5mm、長さ40mmの円筒状テスト用成形品を射出成形機にて作成した。

【0043】

【化4】

一般式(4)



【0044】実施例16～21

4.5 mmの二軸押出機を使用して、樹脂温度190°Cに設定し、メインホッパーよりA成分（実施例1と同じボリアミド樹脂を使用。商品名「ダイアミドL1940」）を投入、溶融させる。二軸押出機サイドホッパーより、プランジャーポンプにて表1に示す割合の（B）成分（スルホンアミド誘導体としてN-ブチルベンゼンスルホン酸アミドを使用）及び（C）成分（殺虫剤としてペルメトリンを使用）の混合物を圧入し、更に（D）成分（繊維状無機充填材として平均繊維径0.5 μm、平均繊維長18 μmの8チタン酸カリウム繊維を使用。商品名「ティスマD」、大塚化学株式会社製。表中の種類の欄に「A」と表示）をサイドフィードした。続いてペレット化して実施例16～21の樹脂組成物を得た。また、得られたペレットを用いて射出成形機により、内径15 mm、肉厚1.5 mm、長さ40 mmの円筒状テスト用成形品を射出成形機にて作成した。

【0045】比較例6

4.5 mmの二軸押出機を使用して、樹脂温度240°Cに設定し、メインホッパーよりポリプロピレン樹脂（商品名「UBEポリプロ」、宇部興産株式会社製。便宜上、表中（A）成分の種類の欄に於いて「PP」と表示）80重量部を投入、溶融させる。二軸押出機サイドホッパーより、プランジャーポンプにて20重量部の（C）成分（殺虫剤としてペルメトリンを使用）を圧入し、続いてペレット化して比較例6の樹脂組成物を得た。比較例6の樹脂組成物についても、各実施例と同様にして、内径15 mm、肉厚1.5 mm、長さ40 mmの円筒状テスト用成形品を射出成形機にて作成した。

【0046】比較例7

4.5 mmの二軸押出機を使用して、樹脂温度150°Cに設定し、メインホッパーよりエチレン酢酸ビニル系樹脂（酢酸ビニル含有量3.2重量%、商品名「ウルトラセン750」、東洋曹達工業株式会社製。便宜上、表中（A）成分の種類の欄に於いて「EVA」と表示）80重量部を投入、溶融させる。二軸押出機サイドホッパー

より、プランジャーポンプにて20重量部の（C）成分（殺虫剤としてペルメトリンを使用）を圧入し、続いてペレット化して比較例7の樹脂組成物を得た。比較例7の樹脂組成物についても、各実施例と同様にして、内径15 mm、肉厚1.5 mm、長さ40 mmの円筒状テスト用成形品を射出成形機にて作成した。

【0047】試験例1

各実施例及び比較例で得られたテスト用成形品を25°Cの環境におき、7日目、3ヶ月目、6ヶ月目に、テスト用成形品の両端にゴース（東レ株式会社製、商品名「テトロンC-119スカイラーク」）を取り付け、クサグモ（Agelena limbata）1匹を閉じ込めた試験体を各々5個作成し、24時間後のクサグモの生死を確認した。クサグモの生死は、ピンセットでクサグモに刺激を与え、全く反応がなかった時には死んでいると判断した。結果を表1及び表2に示す。尚、表1及び表2中の殺虫活性の評価は、全試験体（5個）に対する死んだ試験体の割合で評価した。表中、○…クサグモの死亡率80%以上、△…クサグモの死亡率40%以上80%未満、×…クサグモの死亡率40%未満を示す。

【0048】試験例2

実施例1、4及び比較例6、7の樹脂組成物を用いて射出成形により試験片を作成し、引張強度（ASTM D638）、曲げ強度（ASTM D790）、熱たわみ温度（ASTM D648、4.6 kg/cm²）及び耐ガソリン性を試験した。尚、耐ガソリン性は試験片（内径15 mm、肉厚1.5 mm、長さ40 mmの円筒状）をガソリン（出光石油株式会社製、レギュラーガソリン）に25°Cにて浸漬し、24時間後、取り出した直後の試験片の長さを測定し、浸漬前後の寸法変化率によって評価した。結果を表3に示す。尚、表3中、○…寸法変化率0.2%未満、△…寸法変化率0.2%以上、×…溶解を示す。

【0049】

【表3】

	引張強度 (kgf/cm ²)	曲げ強度 (kgf/cm ²)	熱たわみ温度 (°C)	耐ガソリン性
実施例1	370	600	135	○
実施例4	550	800	145	
比較例6	330	400	108	△
比較例7	<50	<50	<40	×

【0050】上記試験例1及び2から明らかなように、各実施例の成形品は、全て殺虫活性を有し、特に、繊維状無機充填材が配合された成形品は、徐放性に優れている。また、実施例の成形品は、強度や耐熱性等を十分に有する。

【0051】

【発明の効果】以上のように、本発明に係る小動物防除性樹脂組成物によって、各種の構造部材等として使用可能な強度、耐熱性及び耐薬品性を有し、小動物防除性能を長期に亘って発現できる小動物防除性部材を得ることができる。

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